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E2M M11A M11D1 M11E1 M11F1 M12A M15
U1S S1715 S1720

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WO 86/03249 A1 US 4870333 A US 4449078 A
US 4234833 A

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WPI

(54) Automatic door opening and closing

(57) A drive unit for a remotely controllable operator more especially an operator for garage doors. The drive unit is microprocessor controlled and includes a sensing means 39 to sense deceleration of the driving effect of the drive unit. A microprocessor 40 determines limits indicating positions corresponding to open and closed positions of a door coupled with the drive unit if the deceleration exceeds a threshold, which may be variable, and thereby determines the span of movement of the door. Memory means 41 are provided for storage of the span value whereby the microprocessor can control the duration of operation of the drive unit to move a door coupled therewith between open and closed positions. The drive unit further includes a gearbox for transferring drive from a motor 14 to an output shaft 21. The gearbox has a clutch 23 which is constantly in driven coupling with the motor. The clutch incorporates gear teeth 27 which mesh with a gear 25 coupled with shaft 21. Operating means 31 operable by means 32 external of the gearbox cause clutch 23 to move into and out of engagement with gear 25 such that drive to shaft 21 can be effectively obtained.

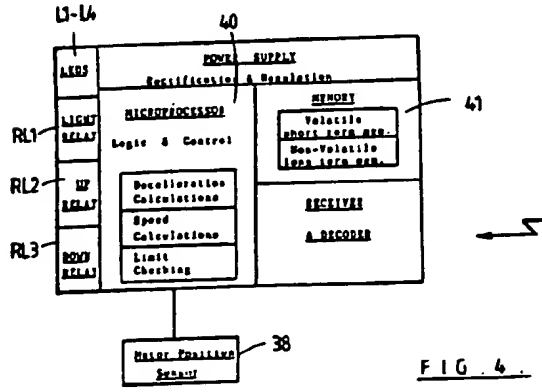


FIG. 4.

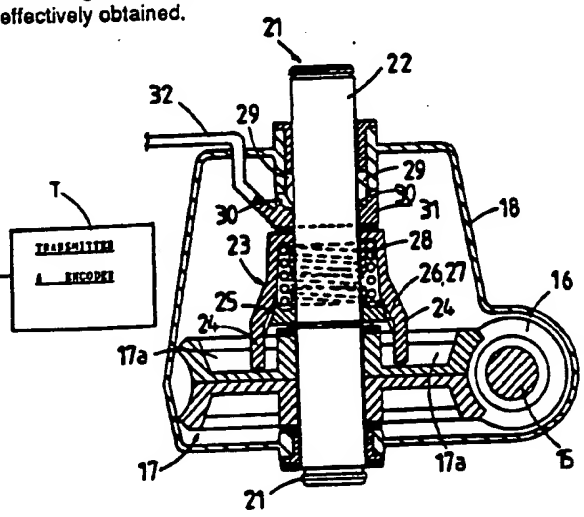


FIG. 2.

GB 2 245 389 A

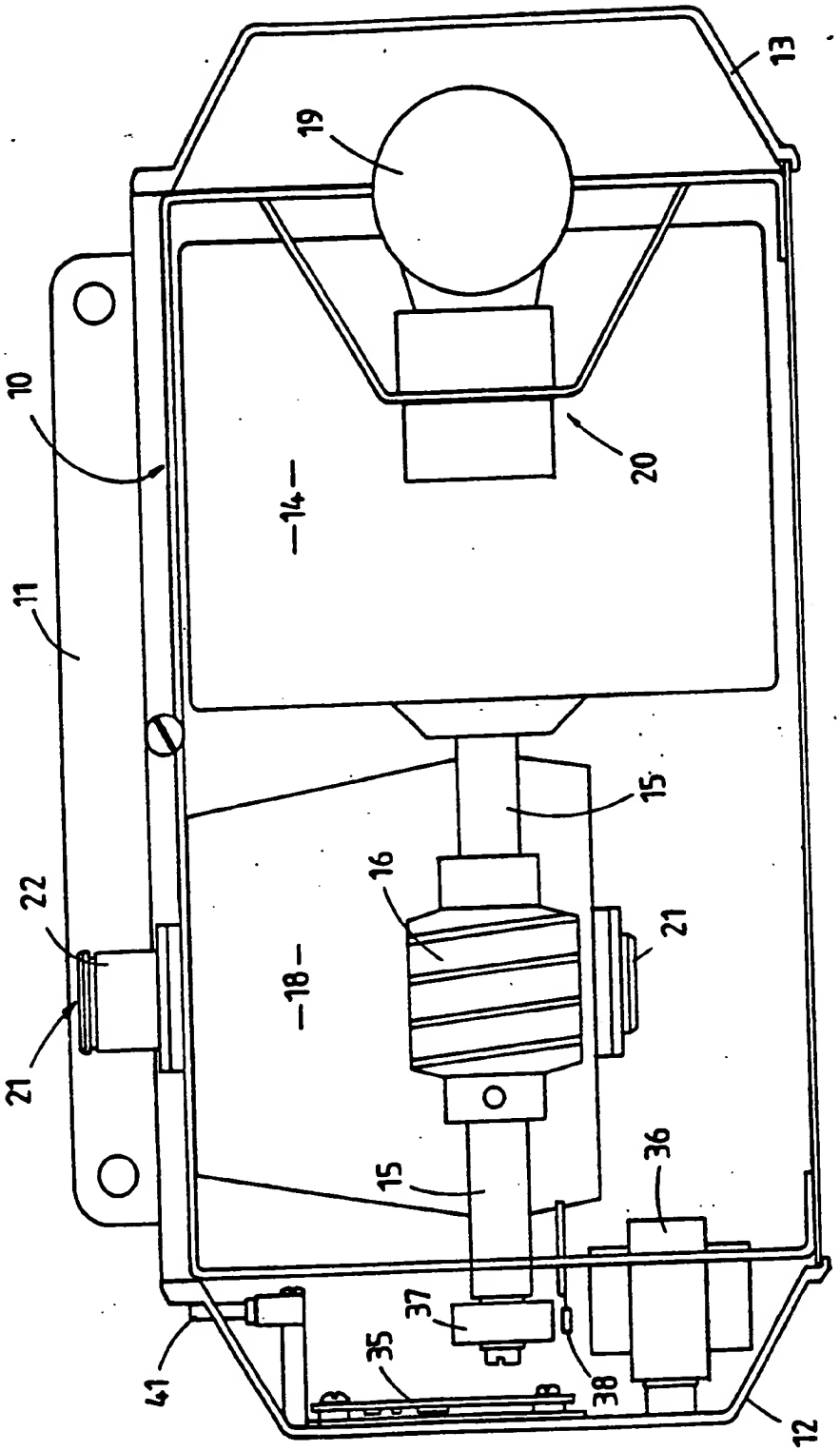


FIG. 1.

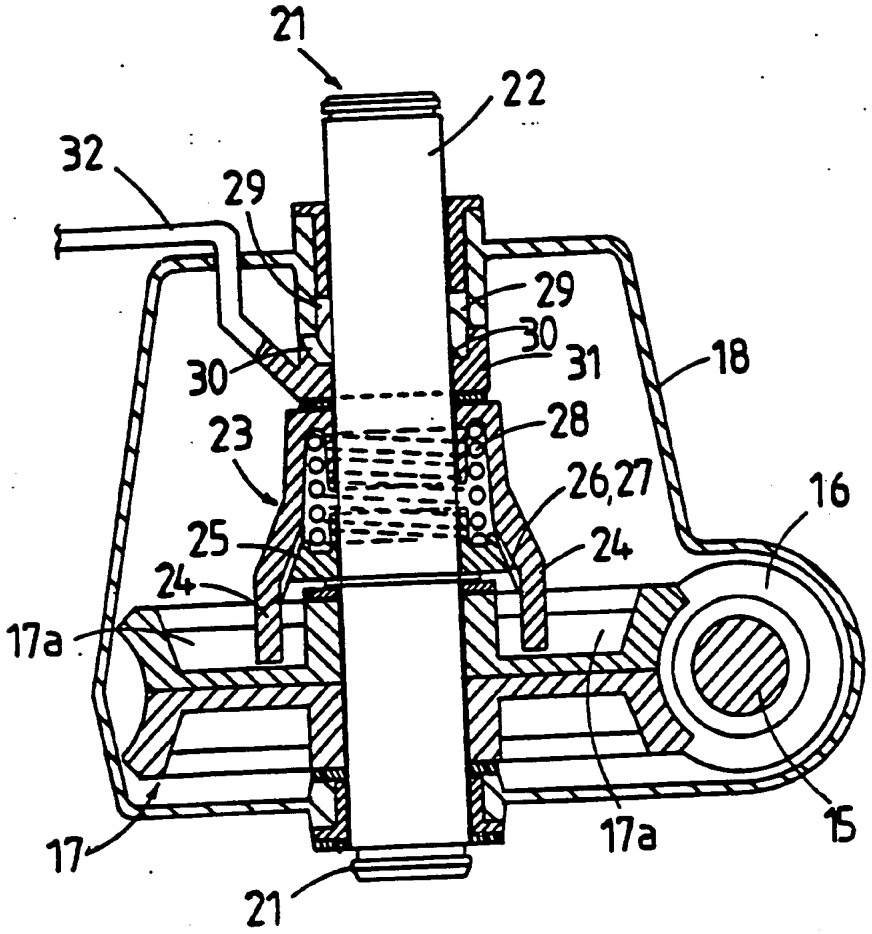
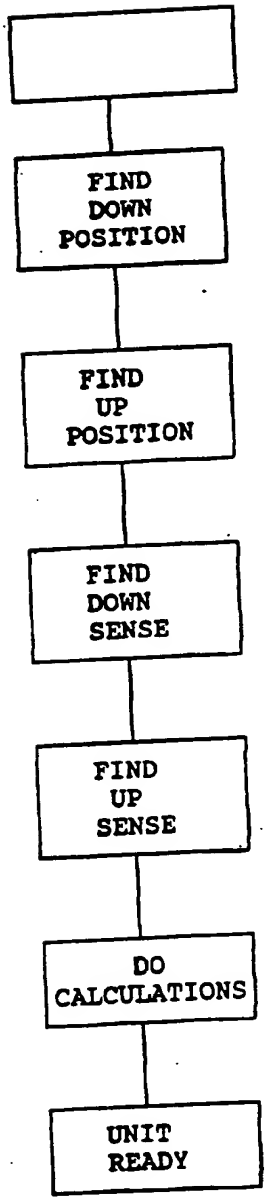


FIG. 2.

LEARN MODE



STEP 0: DOOR OPEN READY TO INSTALL

STEP 1: CHECK DECELERATION

STEP 2: CHECK DECELERATION

STEP 3: CHECK MOTOR SPEED

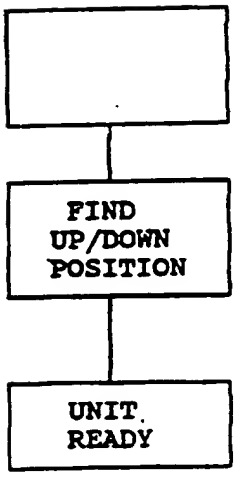
STEP 4: CHECK MOTOR SPEED

STEPS: SAVE SPAN
SAVE SENSE
SAVE ABOVE MID

FIG. 3A.

C

POWER UP MODE

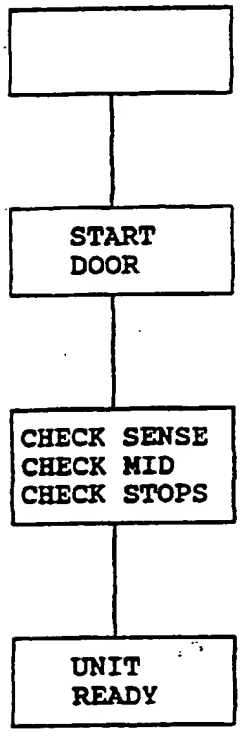


STEP 0: RETRIEVE SENSE
RETRIEVE SPAN
RETRIEVE MID POINT

STEP 1: TRAVEL IN DIRECTION
INDICATED BY MID POINT

FIG. 3B.

RUN MODE



STEP 0: DOOR IN ANY POSITION

STEP 1: DOOR TRAVELS IN
OPPOSITE DIRECTION
FROM LAST OPERATION

STEP 2: - CHECK IF PAST MID POINT
SAVE PAST MID IF SO.
- CHECK IF SENSE IS
TOO SLOW?
STOP DOOR IF SO.
- CHECK FOR END STOPS

FIG. 3C.

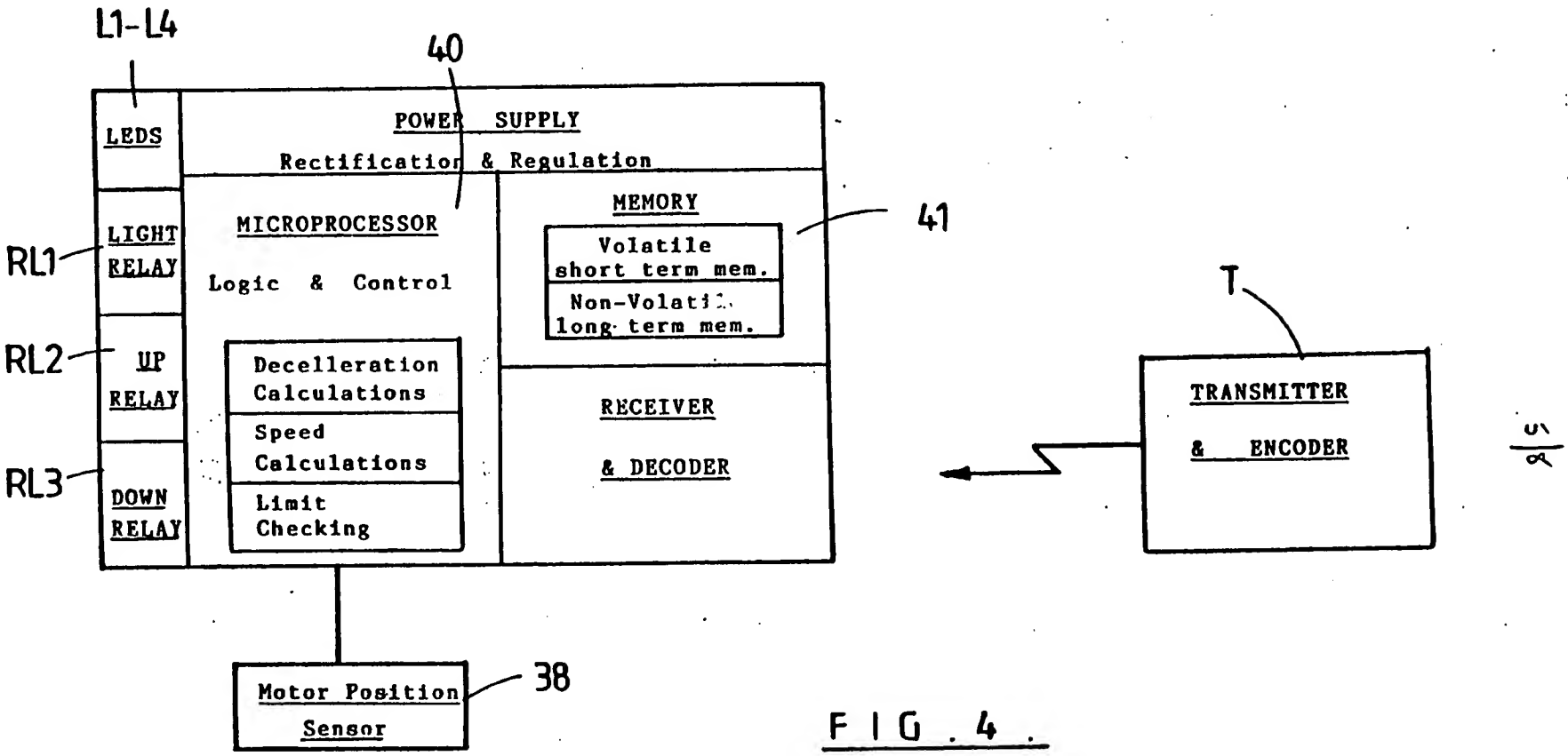

L1-L4
40
LEDS
POWER SUPPLY
Rectification & Regulation
MEMORY
41
RL1
LIGHT RELAY
MICROPROCESSOR
Logic & Control
Volatile short term mem.
Non-Volatile long term mem.
RL2
UP RELAY
Decelleration Calculations
Speed Calculations
Limit Checking
RECEIVER
& DECODER
RL3
DOWN RELAY
T
TRANSMITTER
& ENCODER
Motor Position Sensor
38

FIG. 4.

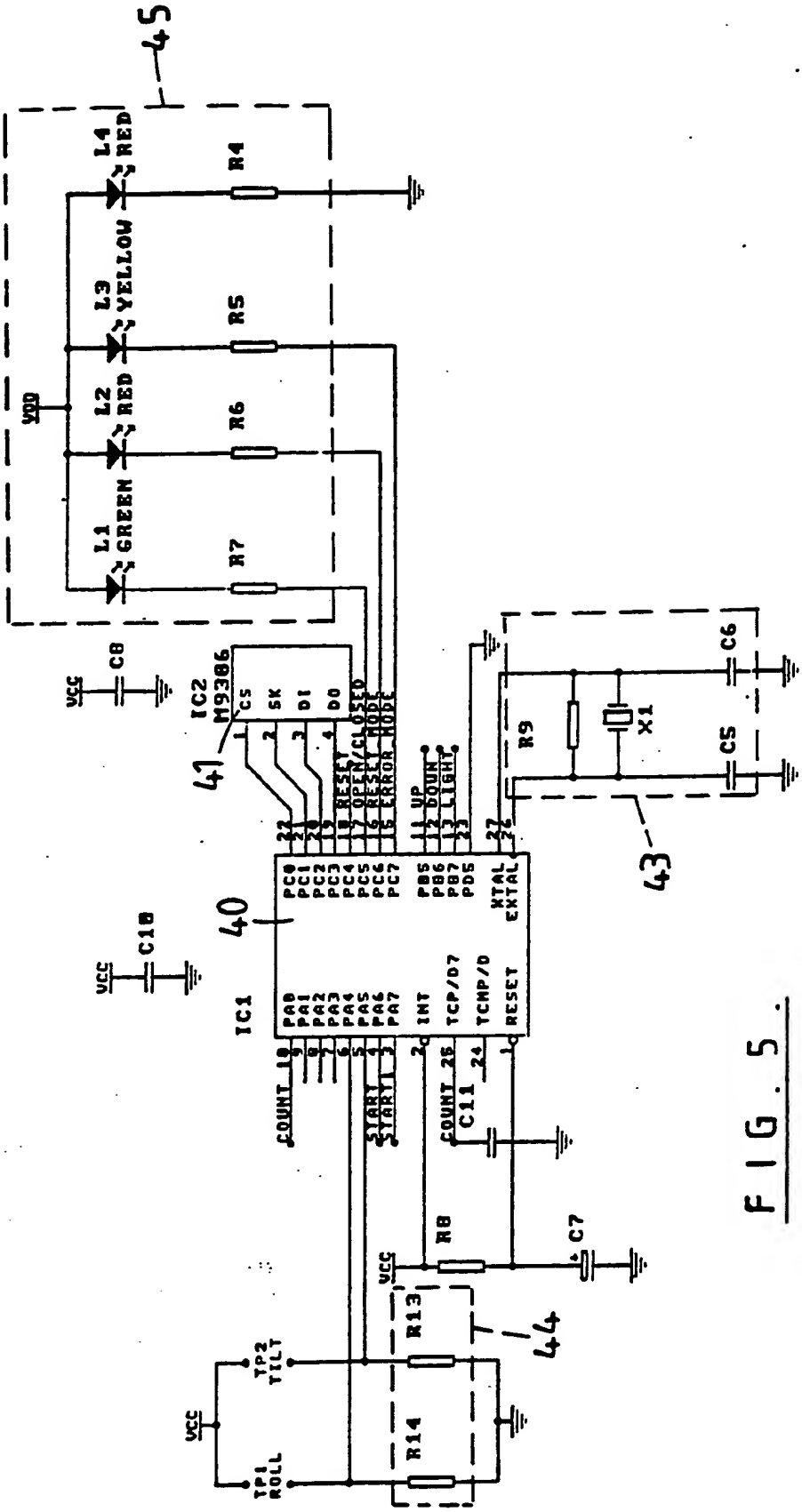

45
L4 RED
L3 YELLOW
L2 RED
L1 GREEN
R4
R5
R6
R7
VDD
VCC
C8
IC2 M9386
CS
SK
DI
DO
41
RESET
OPEN/CLOSED
RESET MODE
ERROR MODE
UP
DOWN
LIGHT
R9
X1
C6
C5
43
IC1
40
C10
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PB5
PB6
PB7
PD5
XTAL
EXTAL
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
INT
TCP/D7
TCMP/D
RESET
COUNT 10
START
START 1
COUNT 25
C11
R8
C7
R13
R14
44
TP2 TILT
TP1 ROLL

FIG. 5

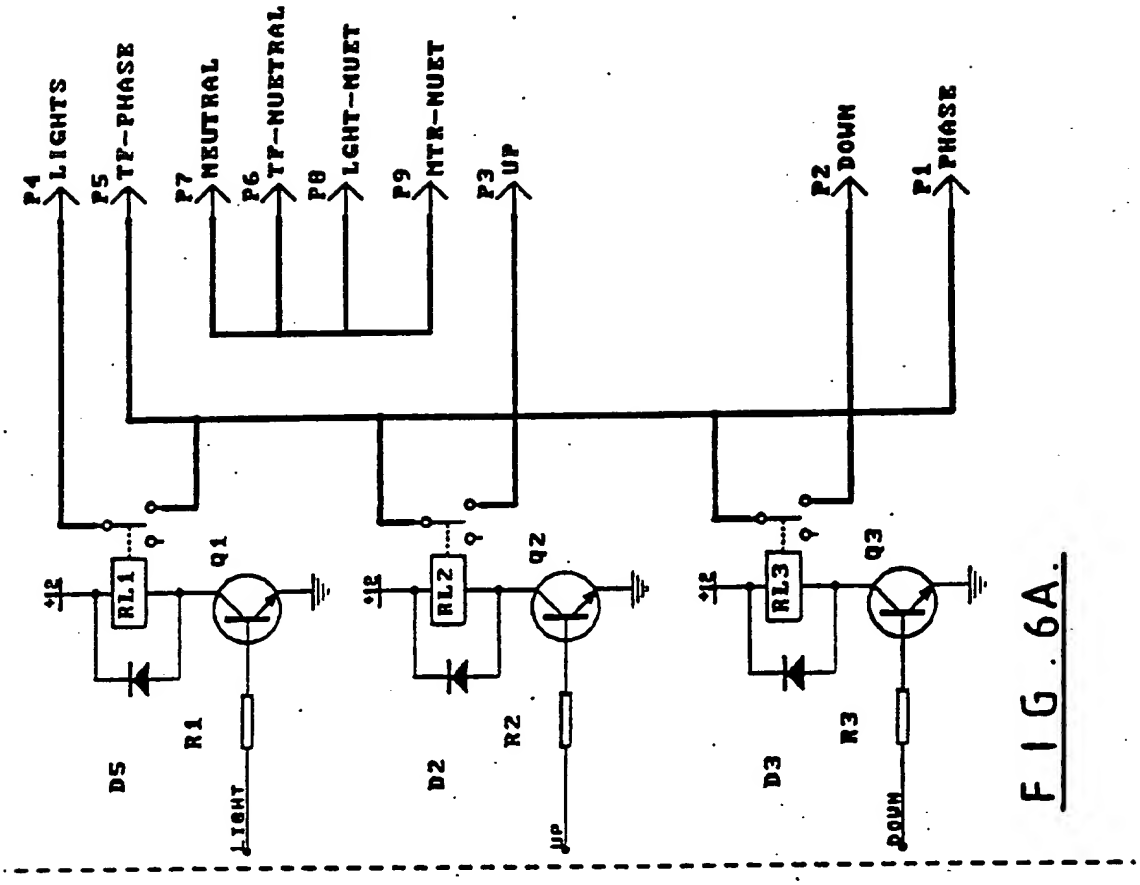

P4 LIGHTS
P5 TP-PHASE
P7 NEUTRAL
P6 TP-NUETRAL
P8 LGHT-NUET
P9 NTR-NUET
P3 UP
P2 DOWN
P1 PHASE
+12
RL1
RL2
RL3
Q1
Q2
Q3
D5
R1
D2
R2
D3
R3
LIGHT
UP
DOWN

FIG. 6A.

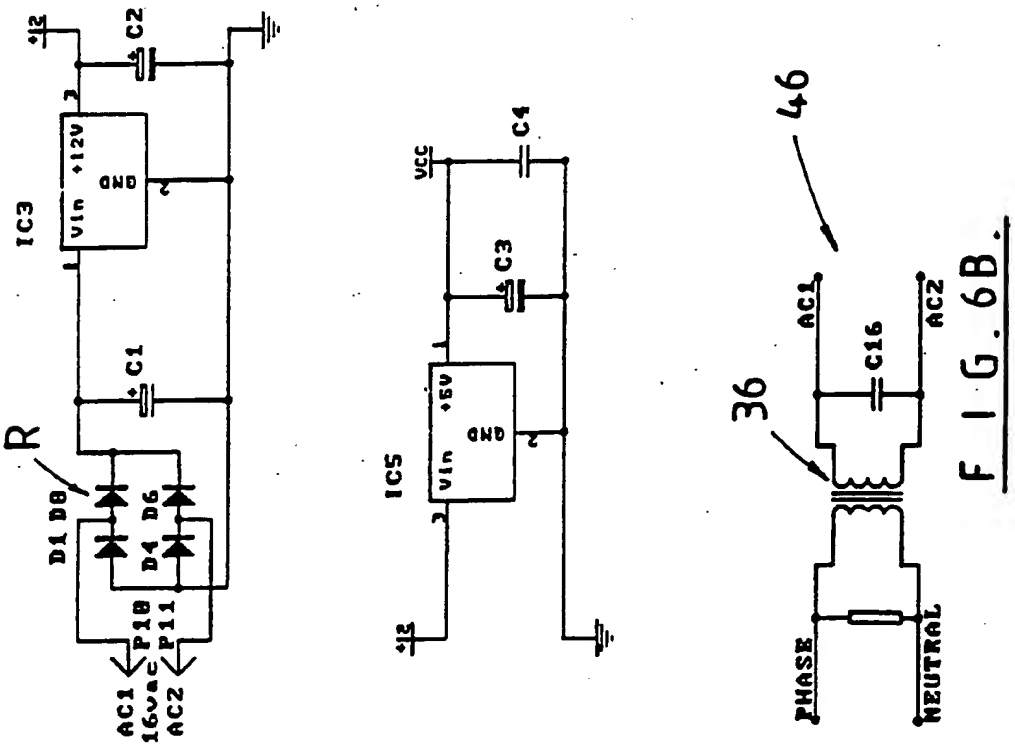

+12
C2
IC3
Vin +12V GND
C1
R
D1 D8
D4 D6
P10
P11
AC1
16vac
AC2
VCC
C4
C3
IC5
Vin +5V GND
46
36
AC1
AC2
C16
PHASE
NEUTRAL

FIG. 6B.

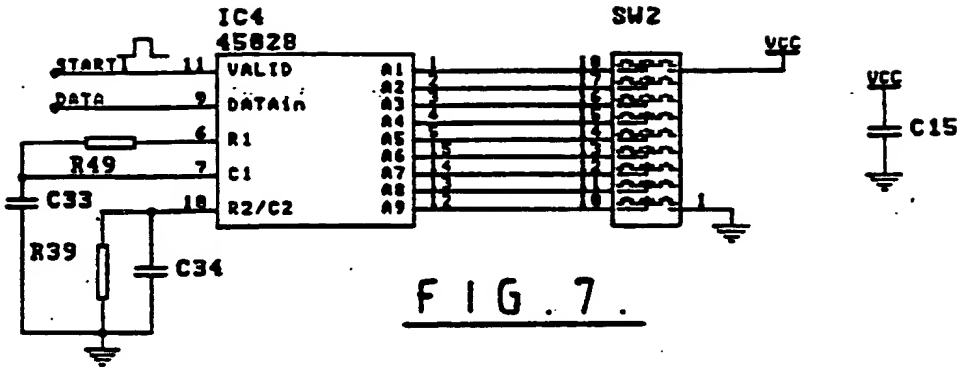


FIG. 7.

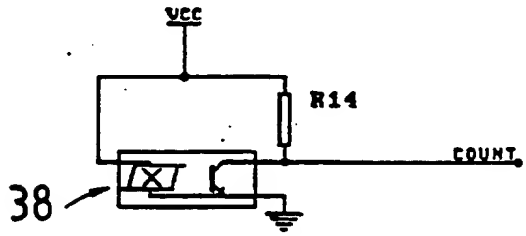


FIG. 8.

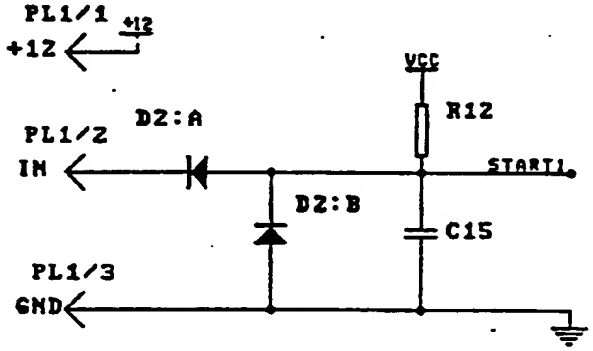


FIG. 9.

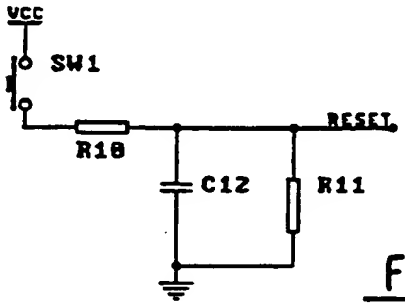


FIG. 10.

Improvements in and Relating to Do r Operators

This invention relates to a remotely controllable door operator.

It is common practise to provide door operators for tilt type and roller type garage doors as well as other closures such as gates. Generally these operators are remotely controllable such that a user can cause the closure to open and shut when the user is situated at a remote location e.g. in a motor vehicle. Such operators not only allow for convenient operation of the closure but also provide security for the user as the user does not have to leave the security of his or her vehicle to operate the closure.

While the present invention relates to an operator for use with a variety of closures the following description will for ease of reference refer to doors especially tilt type garage doors.

Known remotely controlled operators, while providing the necessary opening and closing operations, suffer from drawbacks. For example most known operators are readily mountable in conjunction with a tilt or roller type door, however, they tend to be time consuming and fidley to adjust in order to achieve correct operation of the door. Also when a "power down" situation occurs, such as when there is a cut in the mains power supply, most known operators need to be re-set sometimes with the assistance of a skilled technician. Thus it is an object of the present invention to provide a remotely controllable door operator which is easily and readily able to be adjusted for correct operation.

A requirement f any door operator is that the drive between the perat r and the door can be readily and quickly disconnected. For exampl while operators ar adjustable for sensitivity (that is the operator can sense an increased loading due to an obstacle inhibiting correct operation of the door) so that the direction of movement of the door can be reversed if an obstacle is encountered, situations can arise where even reverse movement of the door is to be avoided. More commonly, however, disconnection of the drive is required when there is a power down situation so that the door can be operated manually.

To this end it is common to provide with tilt door drives a lever on the trolley unit which connects the door to the drive chain. By operating this lever the trolley can be disconnected from the chain thereby enabling the trolley to move freely on its rail and thus the door to be operated independently of the drive unit. However, it has been found that persons wanting to gain unauthorized access to the area closed by the door can, by using a suitable thin elongate tool, manipulate the lever from outside the door to thereby release the trolley from the drive chain and so operate the door manually.

Thus it is another object of the invention to provide an arrangement internally of the drive unit of the operator which provides for disengagement of the drive from the door.

These and other objects and advantages of the present invention will become apparent from the following description of a remotely controllable operator according to preferred embodiments of the invention.

Broadly in one aspect of the invention there is provided a drive unit for a remotely controllable perator, the drive unit being characterized by a gearbox for transferring drive from a motor to an output shaft, said gearbox including a clutch coupled to said motor to be constantly driven by said motor when the motor is operating, said clutch incorporating gear teeth which are meshable with a gear carried by or coupled with said output shaft, there being operating means operable externally of the gearbox to cause said clutch to move into and out of engagement with said gear such that drive to the output shaft can be effectively obtained.

According to a second broad aspect of the invention there is provided a drive unit for a remotely controllable operator, the drive unit being microprocessor controlled, there being sensing means to sense deceleration of the driving effect of the drive unit whereby the microprocessor can determine limits indicating positions corresponding to open and closed positions of a door coupled with said drive unit, and thereby determine the span of movement of the door, there being memory means for storage of such span value whereby the microprocessor can control the duration of operation of the drive unit to move a door coupled therewith between open and closed positions of the door.

In the description which follows reference will be made to the accompanying drawings in which:-

Figure 1 is a plan view of the drive unit of the remotely controllable operator according to the invention,

Figure 2 is a sectioned elevation view of the gearbox of the drive unit of Figure 1,

Figures 3A, 3B and 3C are thre flow diagrams of the perational logic f the el ctronic circuitry of the operator,

Figure 4 is a block diagram of the circuitry,

Figure 5 is a circuit diagram of the microprocessor,

Figure 6A is a circuit diagram of the relay drive circuitry,

Figure 6B is a circuit diagram of the power supply circuitry,

Figure 7 is a circuit diagram of the decoder circuitry,

Figure 8 is a circuit diagram of the sensor,

Figure 9 is a circuit diagram of the remote operations circuitry, and

Figure 10 is a circuit diagram of the install circuitry.

In accordance with known constructions of remotely controllable door operators for tilt or roller doors a drive unit is provided and this houses an electrically powered motor which is coupled to a mechanism which controls the motor to effect opening and closing of the door. For example with a tilt type door the drive shaft of the drive unit has mounted externally of the housing a sprocket which engages with a drive chain, this drive chain being attached to a trolley which moves on a rail. The trolley is attached to the door such that as the trolley moves in one direction or another along the rail the door is caused to open or close. The drive unit contains a receiver which receives a signal from a remote operating device carried by the user.

The present invention relates primarily to the drive unit itself and not the actual mechanism by which drive from the drive unit is transmitted to the door or other closure such as a gate. Thus the following description will

relate t the drive unit itself and not the mechanism which transfers th drive from the drive unit to the door, gate or the like.

Referring firstly to Figure 1 of the drawings there is shown a drive unit formed by a housing 10 having a suitable mounting flange or the like 11 whereby the housing 10 can be mounted in a suitable position relative to the door. In Figure 1 one side of the housing 10 and the end covers 12 and 13 have been removed to schematically show the interior of the housing 10.

Located within housing 10 is an electrically powered motor 14 which has a drive shaft 15 extending therefrom. A drive worm 16 is mounted on shaft 15 and this engages with a worm gear 17 located within gearbox 18. In the preferred form of the invention worm gear 17 is of two piece acetal construction. The worm gear has radially extending ribs 17a which not only form an integral part of the construction of the worm gear but engage with a dog clutch as will hereinafter be described.

As described above housing 10 has end covers 12 and 13 and in the preferred form of the invention end cover 13 is of a transparent or opaque plastics material. Located behind end cover 13 is a light bulb 19 mounted in a holder 20. In accordance with normal remotely controlled garage door operators the light bulb is wired such that it will glow when the door is operated especially in the opening mode so that the area behind the door is lit.

End cover 12 which is substantially the same in construction though not necessarily materials as end cover 13 houses the electronic circuitry of the operator and this will hereinafter be described.

Gearbox 18 mounts, in suitable bearings, a driv shaft 21 which at end 22 is m unted with a sprocket (not shown) forming the output driv of the drive unit. Driven shaft 21 extends through worm gear 17 and the worm gear is freely rotatable on shaft 21.

A dog clutch 23 is located on driven shaft 21 and once again shaft 21 freely rotates within the dog clutch. A series of fingers 24 of dog clutch 23 engage with the ribs 17a of worm gear 17. While dog clutch 23 is able to move axially on shaft 21 fingers 24 are of such length that they always remain in engagement with ribs 17a.

Keyed to shaft 21 is a drive dog 25, this drive dog having on its conical outer surface a plurality of teeth 26. For example there can be eighty 60° teeth set at 20° angle and these mesh with similar teeth 27 on the inside conical surface of dog clutch 23.

A spring 28 is located within dog clutch 23 and engages on a face surface of drive dog 25. Spring 28 normally urges the dog clutch 23 away from drive dog 25 such that teeth 26 and 27 do not mesh.

Moulded or otherwise provided with the casing of the gearbox 18 are a plurality of angled cam teeth 29. These mate with similar cam teeth 30 moulded or otherwise provided with a sleeve 31 which is rotatably and slidingly engaged on shaft 21. An arm 32 extends from sleeve 31 and extends through the gearbox casing 18 so as to be accessible externally of the gearbox.

Thus as arm 32 is operated it causes sleeve 31 to rotate on shaft 21 which due to the mating of the angled cam teeth 29 and 30 causes the sleeve 31 to move axially along shaft 21. Sleeve 31 engages with an end of dog clutch 23

and thus this axial movement of sleeve 21 causes the dog clutch 23 to move axially against the pressur of spring 28 such that teeth 26 and 27 mesh.

In such position drive from motor 14 is transferred via meshing drive worm 16 and worm gear 17 to the dog clutch 23 and due to the meshing of teeth 26 and 27 to shaft 21. Thus an output drive is provided to the sprocket on end 22 of shaft 21. To disengage this drive a user can operate arm 32 which causes sleeve 31 to move in the opposite axial direction and permits dog clutch 23 to be moved axially by spring 28 so that teeth 26 and 27 no longer mesh. As a consequence drive to the drive sprocket is disconnected.

As the means of engaging and disengaging drive from motor 14 to the output sprocket on end 22 of shaft 21 is internal of the gearbox the portion of arm 32 which is external of the gearbox can be so located and shaped that it cannot be readily engaged by someone wishing to access, without authorization, the area enclosed by the door. In addition a positive and easily obtainable means of connecting and disconnecting the drive is achieved. As fine teeth 26 and 27 are used to provide connection between the dog clutch 23 and drive dog 25 coupling of the dog clutch and drive dog is readily obtained irrespective of the relative angular disposition of the clutch and drive dog.

The gearbox arrangement also tends to isolate loadings from the dog clutch thereby preventing it from jamming on shaft 21. Also as the dog clutch is always in engagement with the radial ribs 17a of worm gear 17 there is no requirement for the worm gear and the dog clutch to be correctly aligned before connection of the drive can be effected.

In a preferred arrangement a microswitch (not shown) is activated by the clutch arm 32 so that when the arm is in the disengaged position it will neutralize power to the electronic circuitry of the drive unit.

As stated above the drive unit is controlled by electronic circuitry which is located within end cover 12. As shown in Figure 1 the circuit board 35 is mounted to the end cover as is transformer 36. Drive shaft 15 extends through the end wall of housing 10 so as to locate within the confines of cover 12 and attached to the end of shaft 15 is a magnetic 37. Located adjacent magnet 37 is a hall effect 38 such that as the motor shaft 15 rotates the hall effect senses each time the magnetic field passes over it.

The electronic circuitry for control of the drive unit (which circuitry is shown in block diagram form in Figure 4) incorporates a microprocessor 40 with onboard ram, rom and timer. Microprocessor 40 carries out system timing, counting and all operations involved in system management.

The electronic circuitry essentially consists of the following:-

1. Microprocessor 40
2. Oscillator 43
3. Electrically Erasable Memory 41
4. Program Option Circuit 44
5. Diagnostic Display 45
6. Power Supply and Power Supply Filter 46 (Figure 6B)
7. Relays and Drivers (Figure 6A)
8. Receiver and Filter
9. Decoder Circuit (Figure 7)
10. Hall Effect Sensor (Figure 8)
11. Remote Operations Circuit (Figure 9)
12. Install Circuit (Figure 10)

The microprocessor 40 is an 8 bit single chip micro controller (68HC05P1 or 68HC05C8) and is connected to a power on reset circuit formed by C7 and R8 to ensure the unit powers on correctly.

The oscillator circuit 43 (X1,C5,C6 and R9) produces the 4MHz clock required for microprocessor 40.

Electrically erasable memory 41 is connected directly to the microprocessor 40. This device contains the set up information (as programmed into it via the set up options) and the operator installation characteristics of:-

SET UP HELD IN EPROM

** - Motor sensitivity (1 or 2 directions)
** - Span i.e. counts between two limits
** - Deceleration required to trip the open/closed sensing
# - Direction of current travel

* - Upper backoff count
* - Lower backoff count
* - Snow stop count
* - Light time count
* - Sensitivity increased %
* - Motor RPM
* - Time for motor to reach 70% of its speed

* - These values are programmed by the program option at TP1, TP2

- These values are altered during the normal operation of the unit

** - These values are recorded at installation of the unit.

Th program opti n circuit 44 (R13, R14) provides thr options for pr gramming the eeprom 41; option 1 being for a roll door, option 2 being for a tilt door and option 3 being previously stored.

The diagnostic display circuit 45 provides (L1,L2,L3,L4,R11,R5,R6,R7) provides operator position information and unit diagnostics. The LED's provide the following indicators:-

LED INDICATORS

Normal Operation

Power on:	Displays continuously while power is connected
Open:	Displays whenever the door is not closed
Reset:	Displays whenever the power has been turned on and no keypress has taken place
Obstruction:	Displays whenever the door is on an obstruction

Error Conditions

Obstruction flash on power up:	Shows unit has not been programmed for a tilt or roll.
Obstruction flash when button pressed:	Memory chip failure. Reprogram
Obstruct and reset simultaneously:	Hall effect error, no count from motor, either motor overheat or hall effect broken.
Obstruction and reset alternatively:	Same as simultaneously except unit is trying to be reset.
Reset flash:	Microprocessor dead.

On Programming

Open:	Indicates program occurred okay
Obstruct flash:	Indicates dead memory

operat d. Microprocess r 40 leaves the light on for a pre-determined period (e.g. five minutes) after the door has reached the end of its movement.

The electronic circuitry also incorporates a plurality of LED's. LED L1 indicates that the door is open and only goes off when the door is in the closed position. LED L3 indicates that the door is blocked and this is detected by the "sensitivity" function. LED L3 lights and remains lit until the next operation.

LED L2 indicates that the drive unit is in a "learn mode". When power is applied to the drive unit this LED lights until either the install button 42 (hereinafter described) is pressed, the transmitter T is operated or the external switch (not shown) is pressed.

Finally LED L4 displays that power is applied to the drive unit.

As indicated above eeprom 41 is onboard pre-programmed for one or two primary door types. It may also be externally programmed for secondary door types. For example, the primary types can be tilt/jamb garage doors and roller garage doors while a secondary type can for example be a hinged or sliding gate.

The memory 41 contains four door dependent values. These are:-

SPAN

The distance the door travels between the fully open and the fully closed limits. This value is not a limit but only a relative distance. Hence when the power is turned on microprocessor 40 does not know exactly where the door is. This means overruns once the power is turned off that

are not counted are not required as the drive unit always looks for its next limit.

SENSITIVITY

This value is calculated by microprocessor 40 upon installation and is remembered until the door is reinstalled. This value is calculated as a percentage of the lowest door speed and takes into account any power fluctuations or any slight variances in operation of the door.

DIRECTION

This is only a flag to remind the unit on a power up which direction to travel in. It is stored each time the door travels through a pre-determined point which conveniently is the mid point.

DECELERATION

This is for most doors the default value unless it has been changed as will hereinafter be described.

Not illustrated in the drawings are the receiver and transmitter circuitry as these are generally in accordance with known circuitry for remotely controllable door operators.

To further describe the invention and the operation of the drive unit reference will be made to the programme logic relative to the accompanying drawings.

Referring to the install mode (Figure 3A) this is a mode which is only selected when the learn LED L2 is illuminated. In this mode two options may be selected, one being a new installation and the other being a power down.

The new installation mode is selected when the unit is first installed and accordingly all other modes are locked out. This mode is also selected when annoying door

reversals occur as usually it is n cessary t reprogramme the sensitivity value.

In the install mode the door is placed (step 0) in the open position before beginning operation of the install mode. In the event that the door is not open the install button can be pressed for more than five seconds. As a result the door will start to open and can be stopped once the open position is reached by the install button being released.

With the door in the open position the install button is pressed momentarily and this commences the install mode. As a consequence the door commences to travel in the closing direction and the closed position or limit is detected (step 1) by the drive unit when the deceleration becomes greater than a pre-set level held in the eeprom.

If during this operation a point is reached where the door sticks or is very heavy it may be necessary to increase the deceleration value. This can be readily achieved by pressing the install button while the unit is looking for its closed limit. This new value is then stored in the eeprom for further power downs.

Once the closed limit has been detected by the unit a non-alterable backoff value is removed from it.

Having reached the closed position the door now starts travelling in the open direction looking for its open limit as per the foregoing. Once the open limit has been detected (step 2) and stored the door recommences its closing operation and senses (step 3) the worst sensitivity points, i.e. where the motor speed is at its lowest. Once the door has closed it will re-open looking nce again for the w rst sensitivity point (st p 4). If

either during the closing r opening peration extra sensitivity is r quir d it may be added by placing a slight restriction to the door movement. Lik wis sensitivity can be reduced by assisting movement of the door.

Having completed this cycle microprocessor 40 carries out calculations these being:-
Span = Open Limit - Closed Limit.
Sense = Maximum of (open sense + close sense) x Y%.

These two values are then stored in the eeprom and the unit is ready for use. This is indicated to the user by the learn mode LED L2 ceasing to be illuminated.

As stated above the second option (see Figure 3B) is a power down and this mode is selected at any time the unit power has been switched off and either the transmitter or external switch is pressed. Consequently it is often the situation that this mode will not even be noticed by the operator or user when a power down has occurred with the door open or closed.

Once the transmitter or external switch is activated further operations thereof will be locked out. The door will commence travel in the direction it has furtherest to go (step 1), that is if the door was last closed then it will open and vice-versa. While it is travelling it is looking for one of its limits as described above except that it will use the saved deceleration value.

Once it has reached one of its limits the CPU will then carry out the following calculations:-
Open Limit = Bottom Limit - Span, or
Closed Limit = Top Limit - Span.

In these calculations the span us d is that which has been retrieved from the eeprom along with the sensitivity and decleration values.

In its run mode (see Figure 3C), which is the normal operating mode of the drive unit, the install mode is locked out until a power down is detected. In the normal operating mode activation of the transmitter or the external switch will make the door travel in the opposite direction (step 1) to which it travelled last. Thus if the door is open it will close and vice-versa.

While the door is moving in the run mode it does five operations as follows:-

(i) The motor revolutions are counted and this is continued until a stop condition is reached hence overruns are always counted.

(ii) A limit check is carried out by microprocessor 40, for each count checking to see if the door has reached one of its limits.

(iii) A sensitivity check is carried out by the current motor speed being continuously checked to see that it is greater than the stored sensitivity value. If it is slower then the motor is stopped and only reversed if the door was closing. The block LED L3 will now be illuminated. If the door is blocked within a predefined distance of its closed position microprocessor 40 will call it its show stop and only display the blocked LED L3 without a door reversal taking place.

(iv) If there has been no count within the last seven seconds and the motor is still turned on a fatal error will be considered to exist. In this situation the motor and lights are turned off, the blocked and reset LED's are simultaneously

flashed and the door will not be abl to b r start d until the power has been turn d ff. This fatal error may for example be caused by two things such as the motor stalling or a broken hall effect sensor.

(v) Programme and memory checking will be carried out and if an error is detected at any time the reset LED will flash and the unit won't respond to anything except a power off. If in such a situation the reset LED flashes when the power is turned on again it means that the memory has been corrupted and must be returned to the manufacturer for servicing.

Thus the electronic circuitry which controls operation of the drive unit enables the operator to be readily installed and adjusted without any time consuming and fidley adjustments being required. In fact in the install mode the microprocessor logic and control results in automatic adjustment of the unit. Even when a power down situation occurs the unit will re-establish its "adjustments" and quite often this will be carried out without the user even being aware that such adjustments are required. The same situation exists when the door has needed to be disconnected from the drive unit as once the door has been reconnected the drive unit will, when next activated, go through the power down mode and the limits of operation will be set without any input from the user or a skilled technician.

CLAIMS:

1. A drive unit for a remotely controllable operator, the drive unit being microprocessor controlled, there being sensing means to sense deceleration of the driving effect of the drive unit whereby the microprocessor can determine limits indicating positions corresponding to open and closed positions of a door coupled with the drive unit, and thereby determine the span of movement of the door, there being memory means for storage of such span value whereby the microprocessor can control the duration of operation of the drive unit to move a door coupled therewith between open and closed positions of the door.

2. A drive unit as claimed in Claim 1 wherein the sensing means is a hall effect associated with magnetic means rotatable commensurate with rotation of a drive means of the drive unit.

3. A drive unit as claimed in Claim 1 or 2 wherein the microprocessor includes a counter which increments upon the drive means rotating such as to cause the door to open and decrements upon the drive means rotating such as to cause the door to close.

4. A drive unit as claimed in Claim 3 wherein the microprocessor includes a timer which measures the time between successive counts by said counter.

5. A drive unit as claimed in Claim 4 wherein the microprocessor includes means to cease operation of the drive unit when the time between counts as determined by said timer is less than a predetermined time.

6. A drive unit as claimed in Claim 5 wherein the memory includes storage means for storing an indication of the direction of movement of a door coupled with the drive

unit each time the door travels through a pr det rmin d point.

7. A drive unit as claimed in Claim 1 further including a gearbox for transferring drive from a motor to an output shaft, said gearbox including a clutch coupled to said motor to be constantly driven by said motor when the motor is operating, said clutch incorporating gear teeth which are meshable with a gear carried by or coupled with said output shaft, there being operating means operable externally of the gearbox to cause said clutch to move into and out of engagement with said gear such that drive to the output shaft can be effectively obtained.

8. A drive unit for a remotely controllable operator, the drive unit being characterized by a gearbox for transferring drive from a motor to an output shaft, said gearbox including a clutch coupled to said motor to be constantly driven by said motor when the motor is operating, said clutch incorporating gear teeth which are meshable with a gear carried by or coupled with said output shaft, there being operating means operable externally of the gearbox to cause said clutch to move into and out of engagement with said gear such that drive to the output shaft can be effectively obtained.

9. A drive unit as claimed in Claim 7 or 8 wherein said clutch includes means for coupling with a drive means associated with said motor.

10. A drive unit as claimed in Claim 9 wherein said coupling means is coupled with said drive means when said gear teeth of the clutch are both meshed and not meshed with said gear.

11. A drive unit as claimed in Claim 10 wher in th r is biassing means which urges said g ar reeth ut f meshing contact with said gear, said operating means being operable to apply a thrust to said clutch such as to overcome the effect of said biassing means.

12. A drive unit as claimed in Claim 11 wherein said coupling means comprises fingers of said clutch which slidingly engage with engagement means carried by a driven gear deriving drive from said motor, the arrangement being such that when said clutch is caused to move by said biassing means said fingers move relative to said engagement means but remain in contact therewith.

13. A drive unit substantially as herein described with reference to and as illustrated by Figures 1 and 2 of the accompanying drawings.

14. A drive unit substantially as herein described with reference to and as illustrated by Figures 3 to 10 of the accompanying drawings.

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